

ABSTRACT

Method and apparatus for dielectrophoretic separation of particles in a fluid based using array of insulating structures arranged in a fluid flow channel. By utilizing an array of insulating structures, a spatially inhomogeneous electric field is created without the use of the embedded electrodes conventionally employed for dielectrophoretic separations. Moreover, by using these insulating structures a steady applied electric field has been shown to provide for dielectrophoresis in contrast to the conventional use of an alternating electric field. In a uniform array of posts, dielectrophoretic effects have been produced flows having significant pressure-driven and electrokinetic transport. Above a threshold applied electric field, filaments of concentrated and rarefied particles appear in the flow as a result of dielectrophoresis. Above a higher threshold applied voltage, dielectrophoresis produces zones of highly concentrated and immobilized particles. These patterns are strongly influenced by the angle of the array of insulating structures with respect to the mean applied electric field and the shape of the insulating structures.